

Energy Policy Act of 2005 Section 1234
Economic Dispatch Study
Responses of Entergy Services, Inc.

Entergy Services, Inc., (“ESI”) on behalf of the Entergy Operating Companies, Entergy Arkansas, Inc., Entergy Gulf States, Inc., Entergy Louisiana, Inc., Entergy Mississippi, Inc., and Entergy New Orleans, Inc. (collectively “Entergy”), hereby submits its answer to the questions relating to economic dispatch propounded by the Department of Energy. Entergy appreciates the opportunity to comment on economic dispatch-related issues. If you have any questions about these comments, please contact Matt Wolf at 501-620-5861 or via email at hwolf1@entergy.com.

SUMMARY

- Entergy currently performs security constrained economic commitment and dispatch over a broad region, serving approximately 23,500 megawatts (“MW”) of load and integrating approximately 26,500 MW of generation;
- Within the application of the principles of economic commitment and dispatch, utility-owned and non-utility owned generation are treated on a comparable basis;
- In addition to long term (monthly, seasonal and one year and longer) solicitations, Entergy solicits power on a weekly, daily and hourly basis to economically displace the commitment and/or dispatch of its own units, consistent with reliability considerations;
- Entergy has been very successful at obtaining such economic displacement for the benefit of its customers; purchases now account for 30% of the Entergy’s energy needs, and the output of “legacy” oil/gas units has fallen to less than 20% of the Entergy Operating Companies’ total energy needs; and
- To obtain further economic displacement of its oil/gas units, Entergy has proposed a weekly simultaneous optimization process at the Federal Energy Regulatory Commission (“FERC”) called the “Weekly Procurement Process” or the “WPP.”

Question 1:

What are the procedures now used in your region for economic dispatch? Who is performing the dispatch (a utility, an ISO or RTO, or other) and over how large an area (geographic scope, MW load, MW generation resources, number of retail customers within the dispatch area)?

Entergy Response:

The Entergy Operating Companies serve approximately 2.7 million retail customers and a number of wholesale customers, most of whom are located in the states of Arkansas, Louisiana, Mississippi, and Texas. The total peak load of the Entergy Operating

Companies is approximately 22,000 MW. This load is served by approximately 25,000 MW of resources owned by or under contract to the Entergy Operating Companies. These resources include owned nuclear, hydro, coal, gas and oil-fired generating units located inside the Entergy region, together with contract purchases from independent power producers (“IPPs”) and other wholesale suppliers (“OWSs”) located both within and outside of the Entergy region.

ESI operates the Entergy system as a single integrated system pursuant to a Federal Energy Regulatory Commission-approved (“FERC”) rate schedule known as the Entergy System Agreement. The Energy Management Organization (“EMO”), a department within ESI, applies principles of economic system operation, including unit commitment and economic dispatch, to serve the customers of the Entergy Operating Companies. In addition, under the provisions of various power coordination agreements, several non-affiliated entities are also a part of the system subject to the economic dispatch of the EMO. These entities include all or parts of the loads and resources of Arkansas Electric Cooperative Corporation, Municipal Energy Agency of Mississippi, and East Texas Electric Cooperative, Inc. These other parties serve approximately 1,500 MW of load with a similar amount of resources.

Moreover, the Entergy system described above is operated as a single control area and the Entergy control area operator must satisfy the control standards (entitled, Control Performance Standards 1 and 2) established by the North American Electric Reliability Council for maintaining continuous balance between generation and load. When this balance is maintained the frequency of the system is maintained at the scheduled value for the interconnection (targeted at 60 Hz, except during time error corrections).

In serving the customers of the Entergy Operating Companies, the EMO applies the principles of economic system operation over several time frames, corresponding to time frames established for the sale of natural gas and power and by the operating characteristics of generating units. For each time frame and on a routine basis the EMO:

1. forecasts customer load,
2. determines the reliability requirements associated with serving the load,
3. discovers gas and oil prices by interacting with market participants,
4. solicits offers from IPPs and OWSs both within and outside of the Entergy region for hourly, daily, weekly, monthly and longer-term power products,
5. analyzes the reliability and economics of system operation over the time frame using state of the art software designed to produce the lowest cost while meeting numerous operating constraints, and
6. schedules the resources of the Entergy Operating Companies and other non-affiliated entities and purchases power based on the results of the analyses.

The EMO has worked with a number of IPPs and OWSs to improve the integration of their power products into the Entergy economic system operation processes, particularly relating to weekly purchases. To this end, the EMO developed a Weekly Request For Proposal (“RFP”) Process that has been in place since the Spring of 2003. Through this

process, the EMO solicits IPPs and OWSs to submit weekly offers to the EMO to be considered as displacement candidates for Entergy's resources. Attached to these responses please find two presentations originally prepared for discussion at workshops held by ESI with IPPs, OWSs and FERC Staff in August and September 2004. The purpose of these workshops was to discuss the Weekly RFP and to offer IPPs and OWSs guidance as to the types of products that would increase the likelihood of selection in the Weekly RFP Process.

In 2004, through the application of the principles of economic system operation and the associated processes, the energy needs of the Entergy Operating Companies were met approximately as follows:

- 50% from low-cost nuclear, coal, and hydro resources of the Entergy Operating Companies
- 30% from purchases from IPPs and OWSs, including Qualifying Facilities ("QFs")
- 20% from gas/oil-fired resources of the Entergy Operating Companies
 - 7% from Entergy units run to ensure the reliability of the system
 - 4% from Entergy oil-fired units that were economically attractive given the high natural gas and purchased power prices
 - 9% from Entergy gas-fired units used to provide load-following and regulation

Question 2

Is the Act's definition of economic dispatch (see above) appropriate? Over what geographic scale or area should economic dispatch be practiced? Besides cost and reliability, are there any other factors or considerations that should be considered in economic dispatch, and why?

Entergy Response:

The Act's definition of economic dispatch is appropriate, and the EMO's applications of principles of economic system operation and associated processes, including unit commitment and economic dispatch, are consistent with this definition: the lowest cost energy is produced – whether from Entergy resources or from other resources (purchases) – to reliably serve customers, recognizing the constraints that exist on the system. In keeping with the principles of economic system operation, if energy is generated from Entergy resources, the variable cost of the energy is used in the economic dispatch and unit commitment decisions and is equal to the incremental fuel cost together with the applicable incremental operating and maintenance costs. Likewise, if energy is procured from IPPs or OWSs, the variable cost of that energy is used in the procurement decision and is equal to the price offered by the seller of the energy. There is no physical limit (minimum or maximum) to the geographic scale or area to which the principles of economic system operation can or should be applied as long as the *delivered* cost of energy is the focus of the optimization. This means that the cost of transmission service

and losses associated with all energy must be included in the decision making processes. Because of this it is possible for Entergy's customers to benefit from the procurement of low-cost, economy energy during many hours of the year from resources located outside of the Entergy region.

There are two additional considerations that are important to highlight. First, purchases the EMO makes from IPPs or OWSs are subject to the availability of transmission service. The availability of this service is studied and granted or denied by the Entergy Transmission Group, which is responsible for planning, constructing, operating and maintaining the Entergy transmission grid. So as to comply with the FERC Standards of Conduct, there are strict limits on the information that can pass between the Transmission Group and the EMO, which is responsible for the purchasing, commitment and dispatch decisions. Entergy has proposed improvements to the way transmission service is studied and granted. These improvements are designed to better integrate the weekly purchases and the commitment and dispatch decisions with information on the transmission system, while still maintaining appropriate separation between the Transmission Group and the EMO.¹ Currently, there are related but separate analyses conducted to determine if transmission access is available for a transaction and if the economics of the transaction is sufficient to accept the offer. These transaction requests are evaluated one at a time. Entergy has proposed to integrate the analysis further by simultaneously considering transmission system conditions with all dispatch alternatives (*i.e.*, dispatch of Entergy resources and / or procurement from IPPs and OWSs). The simultaneous consideration of both will provide an additional mechanism to grant transmission access to IPPs and OWSs and thus increase the opportunity for more IPP and OWS sales.

The second additional factor or consideration that must be taken into account in applying principles of economic system operation in the United States is the obligation of utilities under the Public Utility Regulatory Policy Act of 1978 to purchase energy from QFs. As described in more detail in ESI's response to Question 3 below, the amount and variation of QF energy delivered to the Entergy System has increased dramatically over the last few years. In 2004, approximately 9% of the energy requirements of the Entergy Operating Companies was met by unscheduled, non-firm, as-available energy delivered

¹ On June 10, 2003, Entergy filed a Petition for Declaratory Order at FERC seeking guidance on a proposal, called the "Weekly Procurement Process" or the "WPP," to facilitate the continued integration of IPPs and OWSs into the procurement processes used to serve Entergy's native load customers, and to establish an additional mechanism for granting short-term firm transmission service. On September 30, 2003, FERC issued a guidance order on the WPP. Entergy modified the WPP proposal to expand the availability of the WPP to permit Network Transmission Customers under the Entergy Open Access Transmission Tariff ("OATT") to seek to purchase resources through the WPP on the same basis as Entergy. Entergy also developed provisions to include in its OATT to memorialize the evaluation of transmission service associated with WPP purchases described above. For reference, Energy has included copies of its original WPP proposal, FERC's guidance order on the WPP and the current draft of the WPP provisions (Attachment V) proposed to be included in Entergy's OATT with these responses.

to the Entergy Operating Companies by QFs. These unscheduled deliveries to a utility can greatly affect the requirements for load following and regulation on a utility system.

Question 3

How do economic dispatch procedures differ for different classes of generation, including utility-owned versus non-utility generation? Do actual operational practices differ from the formal procedures required under tariff or federal or state rules, or from the economic dispatch definition above? If there is a difference, please indicate what the difference is, how often this occurs, and its impacts upon non-utility generation and upon retail electricity users. If you have specific analyses or studies that document your position, please provide them.

Entergy Response:

Economic dispatch procedures for different classes of generation differ based upon the operational characteristics associated with each generator. In general, utility-owned generation can be dispatched within its design physical limits. These limits include minimum and maximum generation capability, ramp rate, startup and shutdown characteristics and Automatic Generation Control (“AGC”) capability.

In general, non-utility generation can be dispatched within the contractually agreed upon limits, which limits may not be the full physical capability of a particular generating unit. It is Entergy’s experience that contracts for purchases from IPPs typically provide less flexibility than the operation of Entergy’s units. The contractual form of the purchases – typically a pre-determined, constant amount of energy (MWh) in every hour (“block product”) or a pre-determined schedule of energy (MWh) that might vary from hour to hour (“shaped product”) – does not allow the EMO to reduce or increase the energy purchased as system conditions change. That is, if load increases or there is a loss of a generating resource, then there may be no provision in the contracts with the IPPs that allow them to “respond” to this change in circumstance. Changes in the quantity of purchased power generally require renegotiation of an existing agreement or solicitation of additional purchases. In order to meet the Entergy Operating Companies’ obligations as public utilities, the EMO must have sufficient flexible resources committed and on-line each day to match instantaneously supply and load throughout each day. Finally, some power purchases may not even be designated to a particular generating unit. For these purchases there is generally no variation allowed once the purchase contract is made.

Further, one class of non-utility generation output, referred to as “QF put energy” is not under the control of the utility. In Entergy’s case, the amount of QF put energy has increased dramatically over the last few years. QF puts have grown from approximately 6,000 gigawatthours (“GWh”) in 2002 (6% of total 2002 energy requirements) to over 10,000 GWh in 2003 and 2004 (11% and 9% of total energy requirements in 2003 and 2004, respectively). In addition to the volume of QF puts, the variation associated with

QF puts in a given hour can greatly affect the utility. During the first six months of 2005, QF put deliveries on the Entergy system averaged approximately 1,100 MWh per hour. In the course of a single day, however, the hourly quantity of QF put energy fluctuated by as much as 1,600 MWh between hours. Due to the unpredictable supply from QFs, the EMO must commit a large amount of flexible capacity in order to meet reliability requirements and respond to this large variation in QF put deliveries.

With respect to the second part of this question, these practices do not conflict with any federal or state rules.

Question 4

What changes in economic dispatch procedures would lead to more non-utility generator dispatch? If you think that changes are needed to current economic dispatch procedures in your area to better enable economic dispatch participation by nonutility generators, please explain the changes you recommend.

Entergy Response:

At the outset, it is important to clarify that the goal of economic dispatch is to produce the lowest reasonable cost power for customers (whether from utility or non-utility generation), while maintaining the reliability of the grid. As is described in the response to Question 2, Entergy believes that its proposal to improve the integration of IPPs and OWSs into the EMO's procurement processes by simultaneously considering transmission service with all dispatch alternatives will increase the opportunity for additional purchases from non-utility generators. Beyond that, the most important change that can be made to improve the ability of non-utility generators to sell their output is not from modifications to economic dispatch procedures but rather from modifications to the types of products offered by non-utility generators. As mentioned in response to Question 3 above, it has been the EMO's experience that offers from IPPs typically include little operating flexibility. These offers are usually block products or shaped products. And while the price offered has been sufficiently low to cause Entergy to purchase a significant amount of energy from IPPs and OWSs, the prospect for even more purchases is made increasingly difficult by the fact that the offers will be compared to the remaining more efficient and more flexible generation in Entergy's portfolio. These units must be able to ramp up or ramp down to follow the instantaneous fluctuations of load and to accommodate QF puts, which have no limitation on size or duration. Entergy also notes that in addition to the economic dispatch and commitment process, Entergy recently acquired, through its resource planning process, a generation facility from an IPP, and is in the process of acquiring an additional generation facility from another IPP. Once these facilities are acquired, they are dispatched based on their physical design limits as described in the response to Question 3.

Question 5

If economic dispatch causes greater dispatch and use of non-utility generation, what effects might this have -- on the grid, on the mix of energy and capacity available to retail customers, to energy prices and costs, to environmental emissions, or other impacts? How would this affect retail customers in particular states or nationwide? If you have specific analyses to support your position, please provide them to us.

Entergy Response:

As indicated above, the opportunity for greater use of non-utility generation to serve Entergy requirements has been substantially realized. However, if greater use of non-utility generation is achieved through economic dispatch, meaning that IPPs or OWSs offer comparable alternatives to Entergy's load-following resources at lower prices, then retail customers would experience lower costs. The actual level of savings realized is largely dependent on the products offered by the non-utility generators and the prices of their offers. In a September 24, 2003 letter to Commissioner Nora Brownell at FERC, Entergy's CEO, Wayne Leonard, described some of the bidding practices of IPPs. In particular, at page 6, he explained that Entergy "cannot expect to economically displace significant additional energy from our own units – or to retire our existing units and replace the retired capacity with longer-term merchant purchases – until the merchants start to submit bids with prices better than the cost of our own displaceable energy and capacity." A copy of this letter is provided with Entergy's responses.

Question 6

Could there be any implications for grid reliability -- positive or negative -- from greater use of economic dispatch? If so, how should economic dispatch be modified or enhanced to protect reliability?

Entergy Response:

Principles of economic system operation are applied within the constraints imposed by reliability criteria. As long as reliability criteria are explicitly considered in the processes implementing the principles of economic system operation, there should be no impacts for grid reliability—positive or negative—from "greater use of economic dispatch." Changes in dispatch and the use of differing generating resources, whether a non-utility generator or an Entergy generator, must always be subject to the same reliability criteria. In other words, the reliability of the system will be maintained by compliance with the applicable standards irrespective of whether a non-utility generator or an Entergy generator is dispatched. Specifically, IPPs must be required to follow operating instructions with the same level of precision as Entergy's generating units (*e.g.*, respond to AGC signals and comply with voltage schedules) if they are dispatched in lieu of Entergy's own units with AGC.